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Last Edit:
JAD 8/2/13

Five-Year Review Report

Fourth Five-Year Review Report
for
Dixie Oil Processors Superfund Site
Harris County, Texas

September 2013

PREPARED BY:

United States Environmental Protection Agency
Region 6
Dallas, Texas

Approved by: Date:

_____ _____

Carl Edlund
Director
Superfund Division
U.S. EPA, Region 6

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List of Acronyms

AER	Annual Effectiveness Report
ARAR	Applicable or Relevant and Appropriate Requirement
BSTF	Brio Site Task Force
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
1,2-DCA	1,2-Dichloroethane
DNAPL	Dense Non-aqueous Phase Liquid
DOP	Dixie Oil Processors
DOPSTF	Dixie Oil Processors Site Task Force
EA	Endangerment Assessment
EPA	United States Environmental Protection Agency
FFSZ	Fifty-Foot Sand Zone
ICP	Institutional Control Plan
LNAPL	Light Non-aqueous Phase Liquid
MCL	Maximum Contaminant Level
MCU	Middle Clay Unit
MGI	Mud Gully Improvements
MOM	Maintenance, Operations, and Monitoring
NCP	National Contingency Plan
NPL	National Priorities List
NSCZ	Numerous Sand Channel Zone
O&M	Operation and Maintenance
PEC	Probable Effects Concentration
RA	Remedial Action
RAO	Remedial Action Objective

RD	Remedial Design
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SOP	Standard Operating Procedure
1,1,2-TCA	1,1,2-Trichloroethane
TRRP	Texas Risk Reduction Program
TCEQ	Texas Commission on Environmental Quality
UAO	Unilateral Administrative Order
VOC	Volatile Organic Compound

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Executive Summary

The Dixie Oil Processors Site (DOP) is a former industrial site located approximately 20 miles southeast of Houston, Texas, in Harris County. The Site occupies approximately 26.6 acres and is positioned both north and south of Dixie Farm Road, designated as DOP North and DOP South, respectively.

A Record of Decision (ROD) was issued for the DOP Site by the EPA on March 31, 1988. A Unilateral Administrative Order (UAO) was issued by EPA on July 10, 1991, to the DOP Task Force for implementation of the remedy.

The DOP Site Task Force (DOPSTF) notified EPA that remedial activities were completed on March 27, 1993. A Final Closeout Report was issued by EPA on January 18, 1996. The deletion of the DOP Superfund Site from the National Priorities List became effective December 28, 2006.

The trigger for this Fourth Five-Year Review was the September 4, 2008, signature date of the Third Five-Year Review report.

The assessment of this Fourth Five-Year Review found that the remedy was constructed in accordance with the requirements of the ROD and remains protective, consistent with the Remedial Action Objectives (RAO) of this response action. Continued implementation of site controls is necessary to ensure the protectiveness of the remedy.

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Five Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Dixie Oil Processors Superfund Site		
EPA ID: TXD089793046		
Region: 6	**State:** TX	**City/County:** Harris
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Gary G. Miller, Region 6		
Author affiliation: Remedial Project Manager		
Review period: 9/04/2008 – 9/04/2013		
Date of site inspection: 12/13/2012 (DOP South); 3/21/2013 (DOP North)		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/04/2008		
Due date (five years after triggering action date): 9/04/2013		

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Five-Year Review Summary Form (continued)

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): #1	**Issue Category: Monitoring**			
	Issue: Annual monitoring has shown increasing concentrations of chlorinated organics in one DOP Site Numerous Sand Channel Zone (NSCZ) monitoring well during the five-year review period. The origin of the contaminated groundwater is the adjacent Brio Refining Superfund Site and does not impact the protectiveness of the DOP Site remedy.			
	Recommendation: Continue annual groundwater sampling. Ensure that the Brio Site Mud Gully sampling program captures any impacts to the stream from discharge of NSCZ groundwater.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	PRP	EPA	Annual Reports

Protectiveness Statement(s)		
Operable Unit: #1	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* None
Protectiveness Statement: As part of the Fourth Five-Year Review, the EPA and Texas Commission on Environmental Quality (TCEQ) conducted inspections of the Site on December 13, 2012 (DOP South), and March 21, 2013 (DOP North) and determined that the implemented remedial action (RA) is functioning as intended and remains protective of human health and the environment in the short-term. The RA has removed exposure pathways that could have resulted in unacceptable risks by preventing exposure of human receptor populations to contaminated air, soils or groundwater. Long-term protectiveness of the RA will be verified by continued monitoring of groundwater to assess the effectiveness of the Site controls.		

Sitewide Protectiveness Statement (if applicable)	
Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):* *None*
Protectiveness Statement: As part of the Fourth Five-Year Review, the EPA and Texas Commission on Environmental Quality (TCEQ) conducted an inspections of the site on December 13, 2012 (DOP South), and March 21, 2013 (DOP North) and determined that the implemented RA is functioning as intended and remains protective of human health and the environment in the short-term. The RA has removed exposure pathways that could have resulted in unacceptable risks by preventing exposure of human receptor populations to contaminated air, soils or groundwater. Long-term protectiveness of the RA will be verified by continued monitoring of groundwater to assess the effectiveness of the Site controls.	

As part of the Fourth Five-Year Review, the EPA and Texas Commission on Environmental Quality (TCEQ) conducted inspections of the Site on December 13, 2012 (DOP South), and March 21, 2013 (DOP North) and determined that the implemented RA is functioning as intended and remains protective of human health and the environment in the short-term. The RA has removed exposure pathways that could have resulted in unacceptable risks by preventing exposure of human receptor populations to contaminated air, soils or groundwater.

Long-term protectiveness of the RA will be achieved by continued monitoring of groundwater to assess the effectiveness of the Site controls.

Other Comments:

The ROD requires that Site controls be maintained through the use of fencing and the imposition of deed notices and restrictions.

The DOPSTF currently controls the Site with perimeter fencing and locked gates. The expected long-term maintenance and operations at the Site will involve a continual Site presence.

The Institutional Control Plan (ICP), dated February 2, 2006, documents that deed notices and deed restrictions were executed on the Site. During this review period, certified copies of the filed deed notices and restrictions were obtained from the Harris County Clerk's Office.

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Dixie Oil Processors Superfund Site
Harris County, Texas
Fourth Five-Year Review Report

I. Introduction

The purpose of a five-year review is to evaluate the implementation and performance of the selected remedy in order to determine if the remedy is or will be protective of human health and the environment. Since this will be the fourth five-year review, it will determine if the remedy continues to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them.

The EPA (Agency) is preparing this Five-Year Review Report pursuant to CERCLA § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430 (f) (4) (ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The DOPSTF, under the direction of the EPA, Region 6, conducted this Fourth Five-Year Review of the remedy implemented at the DOP Superfund Site in Harris County, Texas. This review was conducted from December 2012 through June 2013. This report documents the results of the review.

The triggering action for this statutory review is the completion of the Third Five-Year

Review on September 4, 2008. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1 - Chronology of Site Events

Event	Date
Copper recovery and hydrocarbon washing activities conducted at the Site	1969-1986
Remedial Investigation/Feasibility Study (RI/FS) complete	1/1988
Record of Decision Signed	3/31/1988
Final Listing on EPA National Priorities List	10/1989
Unilateral Administrative Order	7/10/1991
Start of On-Site Construction	3/25/1992
EPA approval of Remedial Design/Remedial Action Work Plan-Phase I	3/25/1992
EPA approval of Remedial Design/Remedial Action Work Plan-Phase II	8/17/1992
DOPSTF Notification to EPA of Completion of Phase I/II Activities	3/27/1993
Preliminary Closeout Report	6/09/1993
DOP Maintenance, Operations, and Monitoring Plan Submitted to EPA	7/1993
EPA Approved Remedial Action Report	8/6/1993
Final Closeout Report	1/18/1996
DOP Maintenance, Operations, and Monitoring Plan Rev. 1 Submitted to EPA	1/1997
First Five-Year Review	9/24/1998
DOP Maintenance, Operations, and Monitoring Plan Rev. 2 Submitted to EPA	1/1999
Second Five-Year Review	9/04/2003
Institutional Control Plan Finalized	2/2/2006
DOP Maintenance, Operations, and Monitoring Plan Rev. 3 Submitted to EPA	5/2006
Deletion from National Priorities List	8/21/2006
Third Five-Year Review Report	9/9/2008

III. Background

Physical Characteristics

The DOP Site is a former industrial site located approximately 20 miles southeast of Houston, Texas, in Harris County. The site occupies approximately 26.6 acres and is positioned both north and south of Dixie Farm Road, designated as DOP North and DOP South. DOP North covers approximately 19.0 acres, and DOP South covers approximately 7.6 acres, respectively (see Attachment 1, Figure 1).

Attachment 1, Figure 2, shows the layout of the DOP Site. Mud Gully, a Harris County flood control ditch and local tributary of Clear Creek, runs along the eastern boundary of DOP North and the western boundary of DOP South. The Brio Refinery site (Brio) borders DOP to the northeast and a former athletic field borders DOP North to the Southwest. Due north of DOP North is the former Southbend residential subdivision. The Friendswood Oil Field borders the remaining areas.

Land and Resource Use

The current land use of the surrounding area is residential development to the northeast, across Beamer Road. A buffer of undeveloped properties exists to the north, west and south of the site. The property to the south has been used for the establishment of a wetland habitat and preservation of forest habitat as part of a Natural Resource Restoration Project implemented by the BSTF in conjunction with several state and federal agencies. Residential development is evident approximately 0.25 miles to the west of the site.

History of Contamination

DOP North was operated as a copper recovery and hydrocarbon washing facility from 1969 through 1978. A total of six surface impoundments (pits) were used to store and treat wastewater containing copper prior to recovery and discharge. The pits were closed and decommissioned during 1975 and 1977. Several operations occurred at DOP South from 1978 through 1986. These include:

- hydrocarbon washing to produce ethylbenzene, toluene, aromatic solvents, and styrene pitch;
- oil recovery; and
- blending and distilling residues from local chemical plants and refineries (mainly phenolic tank bottom tars and glycol cutter stock) to produce various petroleum products including fuel oil, creosote extender, and a molybdenum concentrate catalyst.

Active operations at the site stopped in 1986. Previously closed surface impoundments located on DOP North were not utilized during DOP South operations. Approximately 6,000 cubic yards of contaminated soils were excavated in 1984 and disposed off-site.

Basis for Taking Action

There are approximately 107,351 cubic yards of contaminated soils and subsoils on the site, associated with six different pits. For the pit samples, ethylbenzene had the highest concentration (6.40 mg/kg) of volatile organic compounds; hexachlorobenzene had the highest concentration (674 mg/kg) of base neutral organic compounds; and copper had the highest concentration (72,860 mg/kg) of inorganic compounds. No organic compounds were found in any subsoil samples.

The EPA concluded that the site potentially poses four major risks to human health and the environment. These risks would result from:

- ingestion of on-site soils;
- direct contact with on-site soils;
- inhalation of dust from the site; and,
- ingestion of shallow groundwater from the site.

Many of the chemicals found on the Site are carcinogens (1,1,2-trichloroethane and methylene chloride) or are toxic to the central nervous system, liver, or respiratory system (toluene and chlorobenzene).

Commented [J1]: NOTE – Copied from the previous 5-Yr Review Report

Institutional Controls

Dated February 2, 2006, the ICP for the DOP Superfund Site provides for institutional control to reduce the risk to public health and the environment from potential hazards posed by the Site. The ICP was incorporated into the Maintenance, Operations, and Monitoring Plan (MOM) as Revision 3 in May 2006. The plan implementation tasks are listed as recordation of institutional control documents and monitoring of Site security.

Deed restrictions and notices have been filed at the Harris County Clerk's Office for the Site. During this review period, certified copies of each of the deed restriction and notices were obtained from the Harris County Clerk's Office. The certified copies are maintained at the DOP Site office.

The DOP Site is inspected on a regular basis to evaluate compliance with institutional control documents.

IV. Remedial Actions

Remedy Selection

A ROD was issued for the DOP Site by the EPA on March 31, 1988 selecting limited action and monitoring, including fluids stabilization and a site closure cover with institutional control. In accordance with the requirements of the UAO, Docket Number 6-23-91, signed by the EPA on July 10, 1991, the DOP Task Force was directed to design and implement the RA as specified in the ROD.

Summary of Record of Decision

a) Affected Materials and Soils- The DOP Endangerment Assessment identified target cleanup levels based on human exposure to site contaminants. However, the site investigation did ·not identify any contaminated soils on the DOP site that exceeded the action levels discussed in the endangerment assessment.
b) Mud Gully- The ROD calls for widening the flood control ditch to remove the "bottle neck" that exists as it passes the DOP site.
c) Storage Tanks and Drums- Demolish any remaining surface tanks or vessels and dispose of their contents.
d) Site Management –Re-grade and vegetate the entire DOP site to promote drainage and minimize surface runoff. Closure cover all re-graded areas with six inches of top-soil, if necessary, to promote vegetative growth.
e) Site Control- Use permanent site control, impose necessary deed notices and restrictions (if possible), and restrict access to the site by use of a fence or similar barrier.

Remedy Implementation

A ROD was issued for the DOP Site by the EPA on March 31, 1988, selecting limited action and monitoring including fluids stabilization and a site closure cover with institutional control. In accordance with the requirements of the UAO, Docket Number 6-23-91, signed by the EPA on July 10, 1991, the DOP Task Force was directed to design and implement the RA as specified in the ROD.

The EPA issued the UAO to 12 respondents in July 1991. The UAO contained a detailed Scope of Work for the implementation of the RD/RA. Monsanto Corporation assumed the lead for implementation of the RA by settling with the other respondents and managing the DOP Task Force.

The DOPSTF prepared an RD/RA work plan for the implementation of the UAO and Scope of Work. The EPA approved the Phase I work plan on March 25, 1992. The Phase I activities included:

- Removal of surface contamination;
- Improvement of surface water controls;
- Reconstruction of Mud Gully;

• Revegetation and installation of security fencing.

The Phase II work plan was approved by EPA on August 17, 1992. Phase II activities included:

• Removal and off-site disposal of tank residuals;
• Dismantlement of the process tanks and drums;
• Disposal of process equipment.

The DOP Task Force notified EPA that Phase I and Phase II activities were completed on March 27, 1993. A pre-certification inspection was conducted by EPA on April 20, 1993. The EPA noted minor items that required additional work. The DOP Task Force corrected these items and in a letter dated April 27, 1993, certified that the RA was complete. The EPA completed the Preliminary Closeout Report on June 9, 1993.

The DOP Task Force prepared a RA Report that contained a certification by a Texas Professional Engineer that all the requirements of the Remedial Design were met. The EPA approved the report on August 6, 1993 and issued a Final Closeout Report on January 18, 1996.

System Operation/Operation and Maintenance

In July 1993, the DOP Task Force submitted a Maintenance, Operations and Monitoring (MOM) Plan for the DOP site. The Plan was revised in January 1999 and again in May 2006. The purpose of the MOM Plan is to document procedures to be used to assess the long-term success of the site remedy while minimizing adverse natural or man-made impacts on the DOP site. The Plan requires (i) monthly inspections and maintenance, (ii) a five-year review as required by the EPA, and (iii) monitoring of groundwater.

Monthly Site Inspections

The DOP Task Force conducts monthly site inspections to identify any damage to the site facilities, and monitors the general health and integrity of the soil closure cover, vegetation, etc. In general, the Task Force conducts the following actions at the site:

- inspect the site closure cover for potentially detrimental, localized settlements, presence of burrowing
- animals, erosion, and evidence of closure cover failures such as discolored soil or debris,
- maintain healthy vegetation in the capped areas,
- clear obstructions from the drainage swales and surface discharge structures to promote free drainage,
- inspect the banks of Mud Gully for incipient erosion,
- landscape with trees,
- monitor integrity of the fence line for any damages,
- trim trees, as required,
- clear vines out of fence line fabric, as required,

- monitor any trespassing at the property,
- clear trash/debris that accumulates with time,
- fix missing and/or unreadable signs,
- inspect well protective casings and protective pipes for rust, and
- straighten pipeline markers as required.

Monthly inspections also include monitoring upstream erosion of Mud Gully which has the potential to impact the water quality at the site.

Since monitoring began in May 1993, the DOP Task Force has kept records of site activities and submitted them to the EPA on an annual basis. The reports include specific maintenance activities completed during the past year, dates that maintenance activities were performed, names of people and companies performing the maintenance activities, and any replacements or redesigns of deficient materials or equipment. Table 2 presents the annual operations and O&M costs for during the Fourth Five-Year Review period.

Table 2 - Annual System Operations/O&M Costs

Dates		Total Annual Cost
From	To	
1/1/2008	12/31/2008	$8.3K
1/1/2009	12/31/2009	$3.0K
1/1/2010	12/31/2010	$8.1K
1/1/2011	12/31/2011	$9.7K
1/1/2012	12/31/2012	$11.7K

V. Progress since the Last Five-Year Review

This section reviews the protectiveness statement and issues and recommendations from the last five-year review (i.e., the Third Five-Year Review for the DOP Site). The status of the recommendations made in that report are also reviewed and discussed.

Protectiveness Statement from the Last Review

"The assessment of this Third Five Year Review found that the remedy was constructed in accordance with the requirements of the ROD and remains protective, consistent with the RAOs of this response action. Continued implementation of site controls is necessary to ensure the protectiveness of the remedy."

Status of Recommendations

The previous five-year review report stated that the remedy continues to be protective for the long-term. One issue regarding the adjacent Brio Site was identified potentially requiring further evaluation. A summary of this issue and the actions taken at the Brio Site since the previous five-year review are given below:

Issue- "Annual monitoring has shown an increasing concentration of chlorinated organics in DMW-35A during the five year review period. The level of 1,1,2-TCA exceeds the NSCZ groundwater standard for the site. The origin of the groundwater contamination is from the adjacent Brio Refining Superfund site and does not impact the protectiveness of the remedy at the DOP site."

Action- "Continue annual groundwater sampling. Ensure that the Brio Site Mud Gully sampling program captures any impacts to the stream from discharge of NSCZ groundwater."

VI. Five-Year Review Process

Administrative Components

The DOPSTF and the Texas Commission of Environmental Quality (TCEQ) were notified of the initiation of the five-year review on October 24, 2012. The DOP Fourth Five-Year Review team was led by Gary Miller of EPA, Region 6, Remedial Project Manager (RPM) for the Site, with the assistance of DOPSTF.

Community Involvement

A notice was published in the Houston Chronicle and the South Belt-Ellington Leader newspapers on November 25, 2012 stating that a five-year review was to be conducted for the DOP site. No correspondence was received by the EPA as a result of these published notices.

Document Review

This five-year review consisted of a review of relevant documents including the Final Close Out Report, Remedial Action Completion Report, the 1988 ROD, prior five year review reports, and annual groundwater monitoring reports. See Attachment 2 for documents reviewed for this report.

Data Review

The data review focused on an evaluation of the current groundwater monitoring data collected as part of the MOM operations. The groundwater monitoring data collected annually during the five year review period (2008-2013) was reviewed as part of the current five year review. Figure 3 in Attachment 1 provides the annual groundwater monitoring data from 1993 to 2013 for the affected DOP well DMW-35A.

The action levels for the groundwater at DOP were adopted from the Brio Refining site per the DOP MOM Plan. The standards for the NSCZ and Fifty-Foot Sand Zone (FFSZ) groundwater are listed in Attachment 3.

The groundwater data shows that the levels of chemicals detected in the NSCZ and FFSZ have been within groundwater standards over the monitoring period, with the exception of MW35A, screened in the NSCZ. MW35A is located on DOP South and lies outside the soil

bentonite slurry wall installed as part of the Brio Refining Site remedy. The concentrations of 1,1,2-TCA exceeded the NSCZ groundwater standards during the five-year review period. The concentrations of 1,2-DCA exceeded the NSCZ groundwater standard for the 2008 through 2012 annual sample events, but was within the NSCZ groundwater standard for the 2013 sample event. The concentrations of vinyl chloride exceeded the NSCZ groundwater standard for the 2009 annual sample event. The concentrations of 1,1-dichloroethene (1,1-DCE) remained within the groundwater standards during the five-year review period. The Brio Mud Gully and Clear Creek quarterly sample events showed that the NSCZ exceedances did not cause any exceedances of the surface water performance standards. Previous assessments of contamination in DMW35A have attributed the source of contamination to a groundwater plume that originates on the Brio Site and has migrated toward Mud Gully across the DOP Site. Therefore, the impacted wells on DOP South reflect the groundwater contamination originating from the Brio Site.

The Brio Site remedy addresses groundwater contamination outside the soil bentonite slurry wall through the active recovery of ground water from two extraction wells (P0-610 and P0-613). The performance standard for these wells is based on a capture zone to ensure that affected groundwater is hydraulically contained and does not discharge to Mud Gully. A review of the quarterly surface water data collected as part of the Brio Site's monitoring program concluded that the performance standards for Mud Gully and Clear Creek were met during this five-year review period.

Site Inspection

DOP South was inspected on December 13, 2012 by Gary Miller (Region 6, EPA), Fay Duke (TCEQ), Sherell Heidt (TCEQ), John Danna (DOPSTF), Matthew Foresman (Monsanto), Lawrence Engle, (DOPSTF), and Roger Pokluda (GSI). DOP North was inspected on March 21, 2013 by Sherell Heidt, John Danna, and Roger Pokluda.

The site inspection checklist completed during the site visits is included as Attachment 4. Photo documentation of the visit is included in this report as Attachment 5. Overall, the team noted that the site appeared to be well maintained with no maintenance or operational problems apparent.

Applicable or Relevant and Appropriate Requirements Review

A review of applicable or relevant and appropriate requirements (ARARs) was conducted and the results are presented in Attachment 6.

Interviews

Interviews were conducted with key citizens who have the possibility of being impacted by the DOP Site. Mrs. Marie Flickinger is an area resident, the publisher of the South Belt Ellington Leader (a local newspaper), Chairperson for the Brio Site Community Advisory Group, and sits on the Board of Trustees for the nearby community college. Mr. Chris Clark is the general manager of the Clear Brook City Municipal Utility District, which provides water, sewer, garbage, parks, police, emergency medical services, and fire protection

to the residents near the DOP Site. Ms. Sherell Heidt is the TCEQ representative with responsibility for this Site. Details of these interviews are provided in Attachment 7. No major issues regarding the Site were identified during the interviews.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, sampling results, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD. Following the implementation of the remedy, all measures appear to be functioning as designed to control groundwater discharges and air emissions.

Maintenance activities (i.e. site inspections) will maintain the effectiveness of the remedy.

Monitoring activities are being conducted and are adequate to determine the protectiveness and effectiveness of the remedy. Site groundwater monitor wells are sampled on an annual basis.

The ROD did not specify discrete actions to address ecological risks, however, the implementation of the remedy has removed or minimized potential exposures to aquatic or terrestrial receptors. A review of the sediment data collected during the RI/FS was conducted to assess the magnitude of aquatic risk that existed prior to implementation of the remedy using current ecological screening values. Specifically, the level of copper found during the RVFS was compared to the Probable Effect Concentration (PEC). The highest level of copper found in the sediments immediately adjacent to the site was 424 mg/kg which exceeds the PEC of 149 mg/kg. Completion of the Mud Gully improvements has removed this pathway of exposure to aquatic receptors through concrete lining of the channel. Site monitoring has verified that no new contaminated sediments are being transported from the site to the gully.

The implementation of the site-wide closure cover has minimized the potential for exposure to terrestrial receptors. Site inspections look for the presence of burrowing animals and none have been noted to date. Deed restrictions and notices have been implemented to complement the existing site controls (fencing and signs). The Institutional Control Plan, incorporated in the MOM Plan, documents these control measures. Chains and locks on gates are used to resist tampering and access by trespassers.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection still valid?

Since the development of the exposure assumptions, the area surrounding the DOP site has changed dramatically. At the time of the RI, the Southbend Subdivision was located immediately adjacent to the north portion of the site. The subdivision has since been abandoned and demolished, substantially reducing the potential receptors. New subdivisions are currently being developed to the west, approximately 0.25 miles from the site. The cleanup levels used to establish the extent of the remedy are still valid, however, since they were based predominantly on a trespasser scenario.

Changes in Standards to be Considered

The toxicity values used by TCEQ for their Texas Risk Reduction Program (TRRP) have changed for two compounds since the ROD was approved. The Reference Dose (RfD) for chronic oral exposure for 1,1-Dichloroethane (1,1-DCA) was increased from 0.1 mg/kg-day to 0.2 mg/kg-day on March 30, 2007. On March 27, 2003, the RfD for 1, 1-DCE was increased from 0.009 mg/kg-day to 0.05 mg/kg-day, along with the removal of the Oral Slope Factor and Inhalation Unit Risk Factors and the addition of an Inhalation Reference Concentration (0.2 mg/m^3). The changes for 1,1- DCE were all made based on toxicity changes made by the EPA in June 2002; however, the same increase in the RfD for 1,1-DCA has not been made by the EPA. These RfD changes were increases in the toxicity values; therefore, the remedy from the ROD is still more protective than the effects of the RfD changes on risk for these two compounds.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

VIII. Issues

Table 3 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Annual monitoring has shown increasing concentrations of chlorinated organics in one DOP Site Numerous Sand Channel Zone (NSCZ) monitoring well during the five-year review period. The origin of the contaminated groundwater is the adjacent Brio Refining Superfund Site and does not impact the protectiveness of the DOP Site remedy.	N	N

IX. Recommendations and Follow-Up Actions

Table 4 - Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Increasing level of contaminants in NSCZ at DMW-35A	Continue annual groundwater sampling. Ensure that the Brio Site Mud Gully sampling program captures any impacts to the stream from discharge of NSCZ groundwater.	PRP	EPA	Annual Reports	N	N

X. Protectiveness Statement(s)

As part of the Fourth Five-Year Review, the EPA and TCEQ conducted inspections on December 13, 2012, and March 21, 2013 and determined that the implemented RA is protective of human health and the environment in the short-term. The RA has removed exposure pathways that could have resulted in unacceptable risks by preventing exposure of human receptor populations to contaminated air, soils, and groundwater.

Long-term protectiveness of the RA will be achieved by continued monitoring of groundwater to assess the effectiveness of the Site controls and by institutional controls.

XI. Next Review

The next five-year review for the DOP Superfund Site is required by September 2018, five years from the date of this review.

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ATTACHMENT 1

Figures

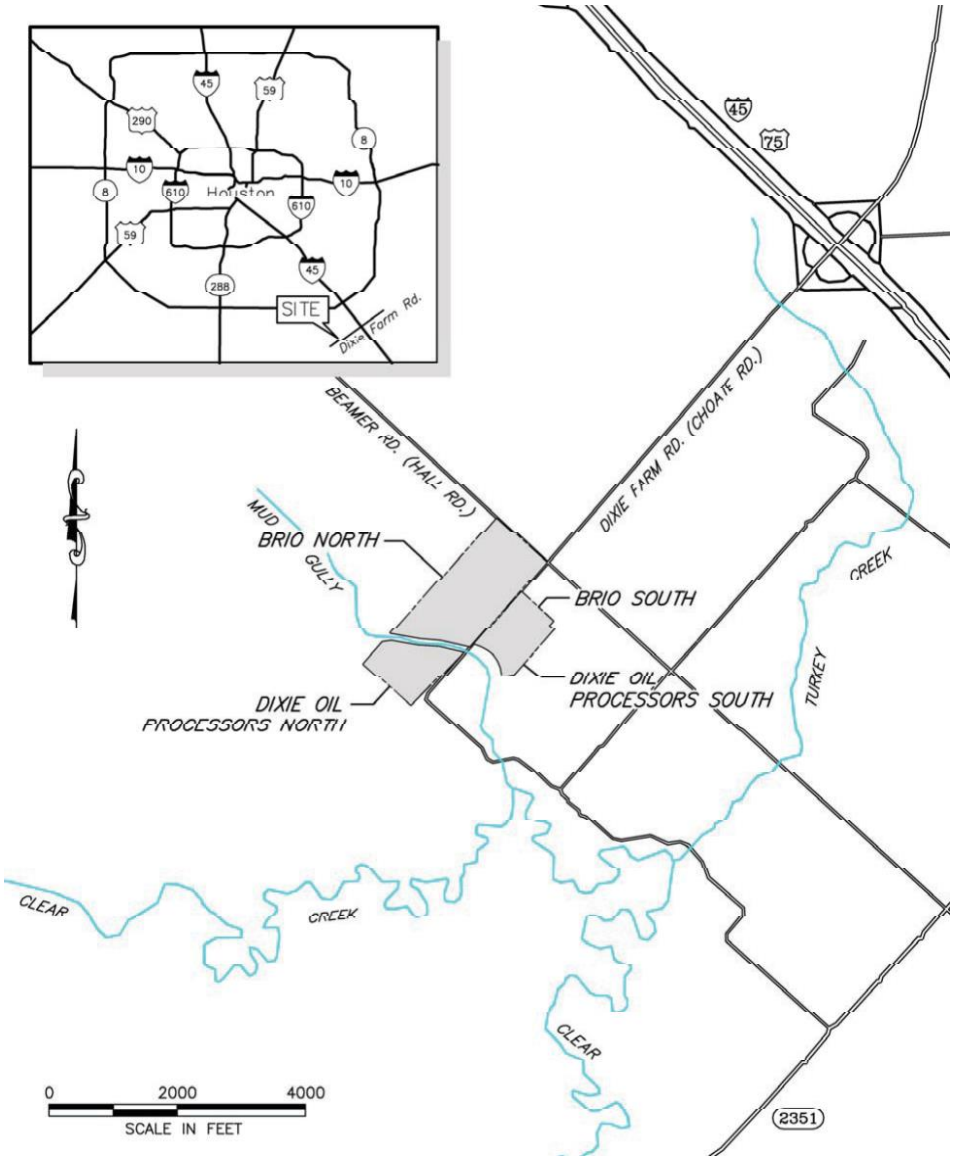
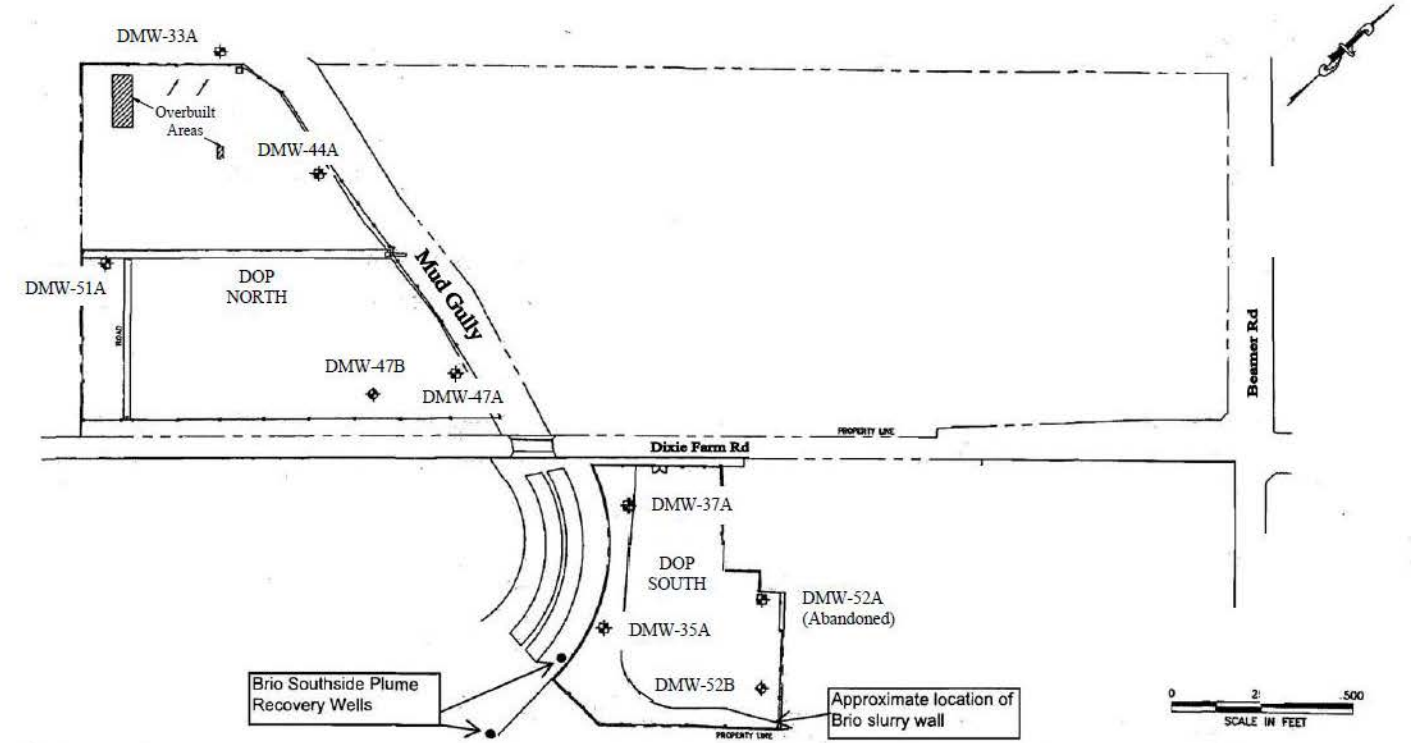
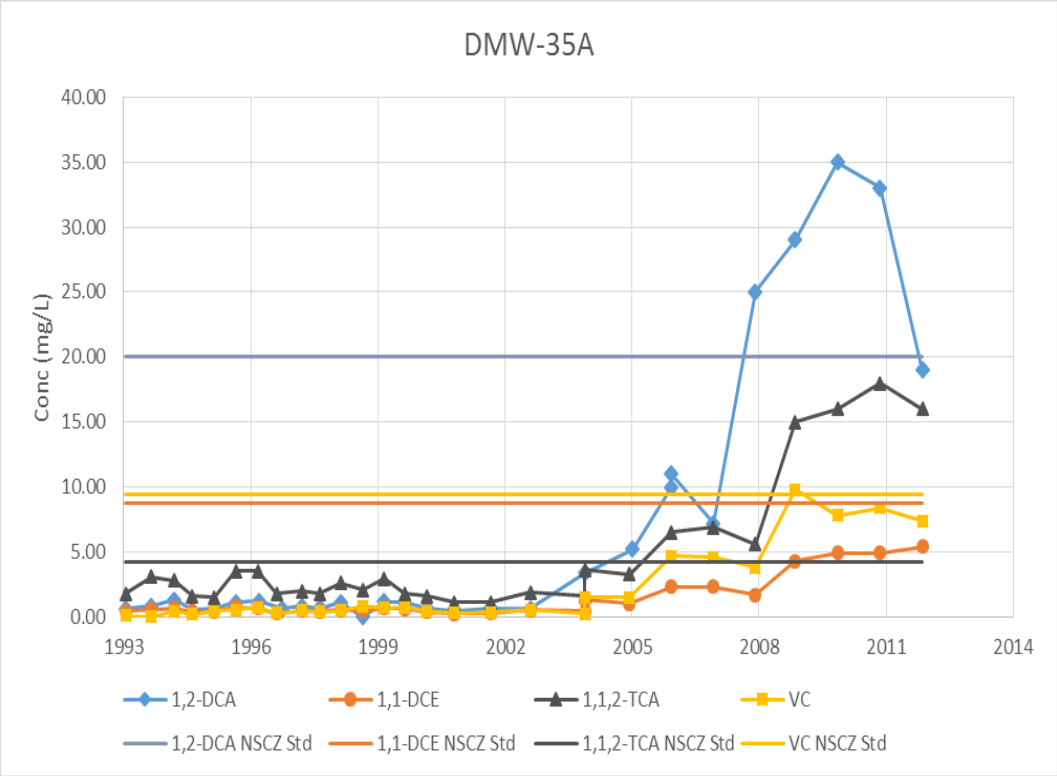


Figure 1
Site Location


DMW-33A
Overbuilt Areas
DMW-44A
DMW-51A
DOP NORTH
Mud Gully
DMW-47B
DMW-47A
Beamer Rd
Dixie Farm Rd
DMW-37A
DOP SOUTH
DMW-52A (Abandoned)
DMW-35A
DMW-52B
Brio Southside Plume Recovery Wells
Approximate location of Brio slurry wall
SCALE IN FEET
LEGEND
NSCZ MONITORING WELL
FFSZ MONITORING WELL
FENCE
DIXIE OIL PROCESSORS SITE HOUSTON, TEXAS
FIGURE 2
LOCATION OF NSCZ AND FFSZ MONITORING WELLS



NSCZ Performance Standards

PARAMETER	CRITERIA (mg/ l)
1, 1, 2-Trichloroethane	4.18
1, 2-Dichloroethane	20.00
1, 1-Dichloroethene	8.74
Vinyl Chloride	9.45

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ATTACHMENT 2

List of Documents Reviewed

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Attachment 2

List of Documents Reviewed

Dixie Oil Processors Site

Dixie Oil Processors Site Record of Decision, March 31, 1988

Dixie Oil Processors Site Post Closure Monitoring, Operations and Maintenance Plan, May 2006

Dixie Oil Processors Site Final Closeout Report, January 1996

Brio Refining Site Amended Record of Decision, July 2, 1997

DOP Superfund Site Third Five Year Review, September 2008

DOP Annual Groundwater Analytical Reports 2008-2013

Brio Refining Superfund Site

Brio Refining Site Mud Gully and Clear Creek Surface Water Analytical Reports 2008-2013

Brio Refining Site Fourth Five Year Review, April 2013

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ATTACHMENT 3

Site Monitoring Criteria

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NSCZ GROUNDWATER
PERFORMANCE STANDARDS

PARAMETER	CRITERIA (mg/ l)
1, 1, 2-Trichloroethane	4.18
1, 2-Dichloroethane	20.00
1, 1-Dichloroethene	8.74
Vinyl Chloride	9.45

FFSZ GROUNDWATER DRINKING WATER LIST AND
MAXIMUM CONTAMINANT LEVEL (MCL) STANDARDS

DRINKING WATER VOLATILE LIST	MCL (µg/ l)
Benzene	5
Carbon Tetrachloride	5
Chlorobenzene	100
1, 2-Dichlorobenzene (o-dichlorobenzene)	600
1, 4-Dichlorobenzene (p-dichlorobenzene)	75
1, 2-Dichloroethane	5
1, 1-Dichloroethene	7
cis-1, 2-Dichloroethene	70
trans-1, 2-Dichloroethene	100
Methylene Chloride (Dichloromethane)	5
1, 2-Dichloropropane	5
Ethylbenzene	700
Styrene	100
Tetrachloroethene	5
Toluene	1,000
1, 2, 4-Trichlorobenzene	70
1, 1, 1-Trichloroethane	200
1, 1, 2-Trichloroethane	5
Trichloroethene	5
Vinyl Chloride	2
Xylenes (Total)	10,000
Total trihalomethanes (TTHMs) *	100

* Total trihalomethanes = Chloroform, Bromodichloromethane, Bromoform, and Dibromochloromethane

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ATTACHMENT 4

Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Dixie Oil Processors Superfund Site	**Date of inspection:** **December 13, 2012 (DOP South)** **March 21, 2013 (DOP North)**
Location and Region: Harris Co., TX; Region 6	**EPA ID: TXD089793046**
Agency, office, or company leading the five-year review: BSTF for the U.S. Environmental Protection Agency	**Weather/temperature:** December 13, 2012 (DOP South): Temperature in the mid 60's, sunny, no rain. March 21, 2013 (DOP North) Temperature in the low 70's, overcast, no rain.

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional control
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached (Section 4 of this checklist)

☒ Site map attached (See Figure 2 of Attachment 1 of main report)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** John Danna (Name) Site Manager (Title) 12/13/12 and 3/21/13 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. 281-922-1054
   Problems, suggestions; ☐ Report attached

2. O&M staff _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency TCEQ
Contact Sherell Heidt (Name) Project Manager (Title) July 25, 2013 (Date) (713) 767-3708 (Phone no.)
Problems; suggestions; ☒ Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☒ Report attached.

Chris Clark – Clear Brook City Municipal Utility District

Marie Flickinger - South Belt-Ellington Leader News, San Jacinto College Board of Regents, Brio Site Community Advisory Group (CAG)

Participants in site visit (DOP South 12/13/12)	Participants in site visit (DOP North 3/21/13)
Gary Miller – Region 6, EPA	John Danna-BSTF
John Danna-BSTF	Sherell Heidt-TCEQ
Lawrence Engle-BSTF	Roger Pokluda-GSI Environmental (DOP Consultant)
Roger Pokluda-GSI Environmental (DOP Consultant)	
Fay Duke-TCEQ	
Sherell Heidt-TCEQ	
Matthew Foresman-Monsanto (BSTF PRP Site Coordinator)	
Paul Clark-BSTF	

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks Maintenance activities are noted on monthly site inspections.

2. **Site-Specific Health and Safety Plan** — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Contingency plan/emergency response plan — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks The Brio Site health and safety plan and contingency plan/emergency response plan are used at the DOP Site due to the overlapping remedial activities and common workers at the two adjacent sites.

3. **O&M and OSHA Training Records** — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits_____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks Actions performed under CERCLA and ARARs listed in Attachment 6 of the main report.

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks_____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks_____

7. **Groundwater Monitoring Records** — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks_____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☒ N/A

    Remarks The DOP Site does not have frequent worker presence or daily activities.

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house
   - ☐ Contractor for State
   - ☐ PRP in-house
   - ☒ Contractor for PRP
   - ☐ Federal Facility in-house
   - ☐ Contractor for Federal Facility
   - ☐ Other_____

2. **O&M Cost Records**
   - ☒ Readily available ☒ Up to date
   - ☒ Funding mechanism/agreement in place (PRP Trust Agreement)
   - Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From 1/1/2008	To 12/31/2008	$8,276.49	☐ Breakdown attached
From 1/1/2009	To 12/31/2009	$3,027.66	☐ Breakdown attached
From 1/1/2010	To 12/31/2010	$8,101.59	☐ Breakdown attached
From 1/1/2011	To 12/31/2011	$9,710.50	☐ Breakdown attached
From 1/1/2012	To 12/31/2012	$11,749.61	☐ Breakdown attached

Total cost for review period

From 1/1/2008 To 12/31/2012 $40,865.85

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons:
   None.

V. ACCESS AND INSTITUTIONAL CONTROL ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks Fences well maintained. Gates secured and locked.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Signs posted on main entrance and other access points.

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C. Institutional Control (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self reporting
Frequency Daily informal and monthly formal inspections
Responsible party/agency DOPSTF
Contact John Danna (Name) Site Manager (Title) 12/13/12 (Date) 281-922-1054 (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached
Inspection and analytical reports are available on-site and are discussed with the EPA project manager.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Deed restrictions and deed notices have been executed for the entire Superfund properties. Certified copies were obtained from the Harris County Clerk's Office and are maintained on-site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks_____

2. **Land use changes on site** ☒ N/A
Remarks_____

3. **Land use changes off site** ☒ N/A
Remarks_____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks_____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent_____ Depth_____
   Remarks

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established ☒ No signs of stress
   ☒ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks The MOM Plan allows for trees and other ground cover.

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☒ N/A or okay
   Remarks_____

2.	**Bench Breached** Remarks_____	☐ Location shown on site map	☒ N/A or okay
3.	**Bench Overtopped** Remarks_____	☐ Location shown on site map	☒ N/A or okay
C. Letdown Channels ☒ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	**Settlement** Areal extent_____ Depth_____ Remarks_____	☐ Location shown on site map	☒ No evidence of settlement
2.	**Material Degradation** Material type_____ Areal extent_____ Remarks_____	☐ Location shown on site map	☒ No evidence of degradation
3.	**Erosion** Areal extent_____ Depth_____ Remarks_____	☐ Location shown on site map	☒ No evidence of erosion
4.	Undercutting Areal extent_____ Depth_____ Remarks_____	☐ Location shown on site map	☒ No evidence of undercutting

5. **Obstructions** Type_____ ☒ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☒ No evidence of excessive growth
☒ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks Passive with carbon canisters

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☒ N/A
   Remarks_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☒ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☒ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent_____ Depth_____ ☒ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks

3. **Outlet Works** ☐ Functioning ☒ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☒ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☒ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☒ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☒ N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually 3-million gallons average per year
   ☐ Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☒ Is of acceptable quality
   Monitoring data is provided and discussed with EPA and TCEQ during quarterly meetings. EPA is notified immediately by email and phone for any issues requiring a regulatory or community response. Annual effectiveness reports are being brought up to date.

2. Monitoring data suggests:
   ☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining
   Remarks The shallow NSCZ groundwater plume on DOP South is being controlled by the Brio Site groundwater recovery system. There have been no FFSZ plumes detected on the DOP Site.

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The selected remedy for the DOP Site is No Action/Limited Action. The remedy relies heavily on site control limits to limit exposure and meet the RAOs. The completion of the RA, including engineering controls to prevent exposure, appears to be functioning as designed. The implementation of institutional control should ensure the long-term effectiveness of the engineering controls.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The required operation and maintenance of the remedy is minimal and is addressed in the EPA approved Maintenance, Operations, and Monitoring Plan. The current plan is being complied with and is ensuring the long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None.
D.	Opportunities for Optimization
	No recommendations at this time.

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ATTACHMENT 5

Photos

DOP South Looking West

Brio South Plume Recovery Well PO-610 near DOP South

Photos taken December 13, 2013

Brio South Plume Recovery Well PO-613 near DOP South

Brio South Plume Recovery Pipeline on DOP South Looking West

Photos taken December 13, 2013

Brio Barrier Wall Alignment on DOP South Looking North

Brio Barrier Wall Alignment on DOP South at Dixie Farm Road Looking North

Photos taken December 13, 2013

Main Gate on DOP North Looking North
DOP

DOP North Fence Line along Dixie Farm Road Looking West

Photos taken March 21, 2013

Main Gate on DOP North Looking North

DOP North Fence Line along Dixie Farm Road Looking West

Photos taken March 21, 2013

DOP North Mowed Pipeline Right of Way Looking North

DOP North Monitoring Well DMW-47B Slab Replacement

Photos taken March 21, 2013

DOP North Looking North

DOP North Monitoring Well DMW-47A

Photos taken March 21, 2013

DOP North Outfall to Mud Gully Looking East

DOP North Central East-West Drainage Swale with Small Amounts of Cover Soil Looking East

Photos taken March 21, 2013

DOP North Monitoring Well DMA-44A

DOP North Eastern Fence Line Looking North

Photos taken March 21, 2013

DOP North Northern Drainage Swale and Outfall to Mud Gully Looking East

DOP North Northern Drainage Swale Looking West

Photos taken March 21, 2013

DOP North Western Fence Line Looking North

DOP North Western Fence Line and Central Concrete Drainage Swale Looking South

DOP North Central Area

DOP North Central Area

Photos taken March 21, 2013

DOP North Central Area

DOP North Monitoring Well DMW-51A
Photos taken March 21, 2013

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ATTACHMENT 6

Applicable, Relevant and Appropriate Regulations (ARARs)

ATTACHMENT 6

Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/Authority	ARAR	Status	Requirement Synopsis	Action to be Taken to Attain ARAR
Groundwater: NSCZ (State Authority)	Texas Surface Water Quality Standards (30 TAC § 307) and Texas Total Maximum Daily Load (TMDL) Program	Applicable	State surface water quality standards have been developed to be protective of an incidental fishery. Appendix C of the March 1988 DOP ROD states that "NSCZ groundwater quality will be maintained such that its discharge does not represent a threat to aquatic life in Mud Gully." Because Mud Gully is a discharge point for the NSCZ, Mud Gully surface water standards are being used for evaluation of NSCZ groundwater monitoring results.	Maintain closure cover in accordance with the MOM Plan. Conduct groundwater monitoring in the NSCZ. Per the January 2002 Addendum to the MOM Plan, monitoring is now conducted annually.
Groundwater: FFSZ (Federal Authority)	Federal SDWA – Maximum Contaminant Levels (MCLs; 40 CFR §141.61)	Relevant and Appropriate	Federal standards (MCLs) have been adopted as enforceable standards for public drinking water systems. Appendix C of the March1988 DOP ROD states that since the FFSZ is not likely to serve as a public water system, MCLs are not applicable but "may be considered relevant." MCLs are being used for evaluation of FFSZ groundwater monitoring results.	Maintain closure cover in accordance with the MOM Plan. Conduct groundwater monitoring in the FFSZ. Per the January 2002 Addendum to the MOM Plan, monitoring is now conducted annually.

Notes:
1) DOP = Dixie Oil Processors.
2) SDWA = Safe Drinking Water Act; ROD = Record of Decision; MOM Plan = Post Closure Maintenance, Operations and Management Plan (originally issued July 1993).
3) FFSZ = Fifty-Foot Sand Zone; NSCZ = Numerous Sand Channel Zone; MCL = Maximum Contaminant Level.
4) Within the First Five-Year Review Report for the DOP Site (dated 9/24/98), EPA terminated the requirement to sample air, surface water, and sediment media. Accordingly, groundwater is the only environmental media currently being monitored.

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ATTACHMENT 7

Interview Record

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The following is a list of individuals interviewed for this five-year review. See the contact records in this attachment for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Mr. Chris Clark	General Manager	Clear Brook City MUD	7/24/13
Ms. Marie Flickinger	Publisher/Owner Chair Trustee	South Belt-Ellington Leader News Brio Community Advisory Group San Jacinto College South	7/25/13
Ms. Sherell Heidt	Project Manager	Texas Commission on Environmental Quality (TCEQ)	7/25/13

DRAFT

INTERVIEW RECORD			
Site Name: Dixie Oil Processors Superfund Site		**EPA ID No.: TXD980625453**	
Subject: Fourth Five-Year Review		**Time:**	**Date: 7/24/13**
Type: ☒ Telephone Visit Other **Location of Visit:**		Incoming ☒Outgoing	
Contact Made By:			
Name: Lawrence E. Engle	**Title: Technical Specialist**	**Organization: DOPSTF**	
Individual Contacted:			
Name: Mr. Chris Clark	**Title: General Manager**	**Organization: Clear Brook City Municipal Utility District (MUD)**	
Telephone No: 281-484-1562 **Fax No:** **E-Mail Address:**		**Street Address: 11911 Blackhawk Blvd.** **City, State, Zip: Houston, TX 77089**	

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)
   Site is cleaned up and well done.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
   Not needed.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. **I am not aware of any problems requiring responses by TCEQ.**

4. Do you feel well informed about the site's activities and progress?
   Yes.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   Have not received any complaints. Everything is just fine.

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INTERVIEW RECORD			
Site Name: Dixie Oil Processors Superfund Site		**EPA ID No.: TXD980625453**	
Subject: Fourth Five-Year Review		**Time:**	**Date:7/25/13**
Type: ☒ Telephone Visit Other **Location of Visit:**		Incoming ☒Outgoing	
Contact Made By:			
Name: Lawrence E. Engle	**Title: Technical Specialist**	**Organization: DOPSTF**	
Individual Contacted:			
Name: Ms. Marie Flickinger	**Title: Publisher/Owner**	**Organization: South Belt Ellington Leader Newspaper**	
Telephone No: (281) 481-5656 **Fax No:** **E-Mail Address:**		**Street Address: 11555 Beamer Road** **City, State, Zip: Houston, TX 77089**	

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)
   I think the site is being well maintained and appears to be secure with perimeter fencing and no trespass signage.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
   As the Community Advisory Group Chairperson for the Brio/DOP Superfund sites I generally get quarterly updates from either EPA or DOP management. In addition, they do a good job of quickly informing me of unanticipated events that occur at the DOP site (such as fence damage from a car accident or pipeline activities in the area).

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
   No.

4. Do you feel well informed about the site's activities and progress?
   Yes.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   The DOP site should never be developed since it could compromise the integrity of the current remedy cover. A compromised remedy could detrimentally impact the health of the surrounding community. Institutional control for the DOP site should be strictly enforced.

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INTERVIEW RECORD			
Site Name: Dixie Oil Processors Superfund Site		**EPA ID No.: TXD980625453**	
Subject: Fourth Five-Year Review		**Time:**	**Date: 7/25/13**
Type: Telephone Visit ☒Other (Email) **Location of Visit:**		Incoming ☒Outgoing	
Contact Made By:			
Name: Lawrence E. Engle	**Title: Technical Specialist**	**Organization: DOPSTF**	
Individual Contacted:			
Name: Ms. Sherell Heidt	**Title: Project Manager**	**TCEQ**	
Telephone No: (713) 767-3708 **Fax No:** **E-Mail Address:**		**Street Address: 5425 Polk Street, Suite H** **City, State, Zip: Houston, Texas 77023**	

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)
   The remedy is functioning as designed and is protective of human health and the environment.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.
   There are no routine activities performed by TCEQ except for attending the EPA quarterly progress meetings.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.
   I am not aware of any issues needing responses by TCEQ.

4. Do you feel well informed about the site's activities and progress?
   Yes.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   No.

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